ABSTRACT

A step-motion actuator using piezoelectric material to launch a flight mass which, in turn, actuates a drive pawl to progressively engage and drive a toothed wheel or rod to accomplish stepped motion. Thus, the piezoelectric material converts electrical energy into kinetic energy of the mass, and the drive pawl and toothed wheel or rod convert the kinetic energy of the mass into the desired rotary or linear stepped motion. A compression frame may be secured about the piezoelectric element and adapted to pre-compress the piezoelectric material so as to reduce tensile loads thereon. A return spring may be used to return the mass to its resting position against the compression frame or piezoelectric material following launch. Alternative embodiment are possible, including an alternative first embodiment wherein two masses are launched in substantially different directions, and an alternative second embodiment wherein the mass is eliminated in favor of the piezoelectric material launching itself.